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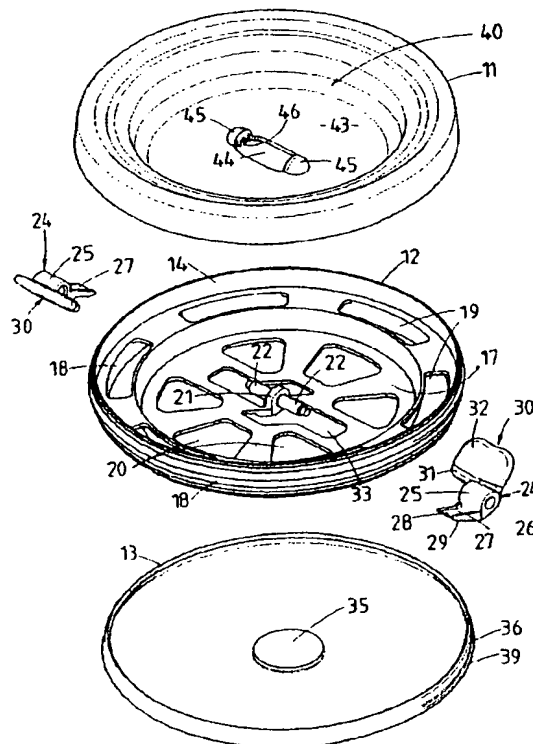
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(54) Abstract Title: **Improvements in closures**

(57) A closure for the open mouth of an airtight container. The closure has a resiliently flexible diaphragm (13) which has a peripheral edge (37) which can sealingly engage against an inside wall surface of the open mouth. The diaphragm (13) is engaged with the second cover section (12) of a cover. A pair of toggles (24) are pivotally mounted on axles (22) of second cover section (12). The levers (30) of the toggles (24) extend through an opening (44) in the first or outer cover section (11) when the first and second cover sections (11, 12) are snap-locked together. By moving the levers (30) toward one another the respective feet (27) of the toggle (24) engage with area (35) of the diaphragm (13) to deform the diaphragm and thereby break a sealing effect between the peripheral edge of the diaphragm and the inside wall surface of the open mouth.



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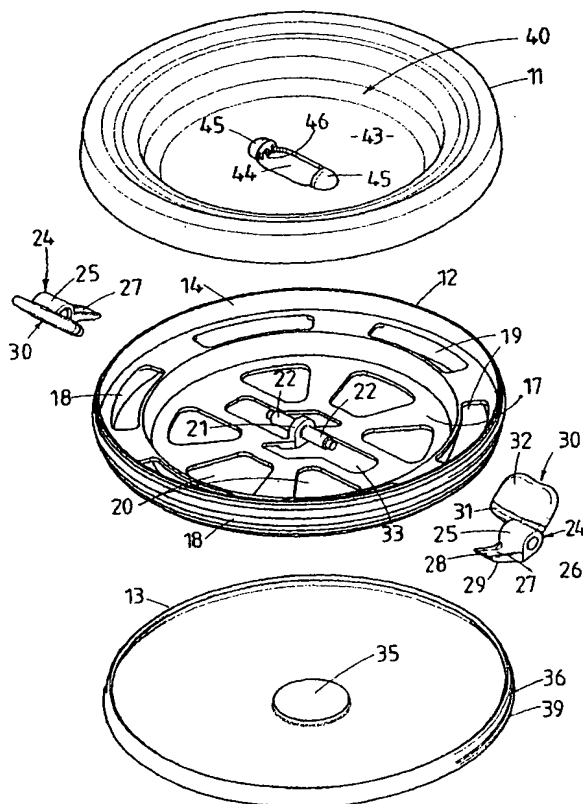
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(54) Title: IMPROVEMENTS IN CLOSURES



(57) Abstract: A closure for the open mouth of an airtight container. The closure has a resiliently flexible diaphragm (13) which has a peripheral edge (37) which can sealingly engage against an inside wall surface of the open mouth. The diaphragm (13) is engaged with the second cover section (12) of a cover. A pair of toggles (24) are pivotally mounted on axles (22) of second cover section (12). The levers (30) of the toggles (24) extend through an opening (44) in the first or outer cover section (11) when the first and second cover sections (11, 12) are snap-locked together. By moving the levers (30) toward one another the respective feet (27) of the toggle (24) engage with area (35) of the diaphragm (13) to deform the diaphragm and thereby break a sealing effect between the peripheral edge of the diaphragm and the inside wall surface of the open mouth.

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*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**"IMPROVEMENTS IN CLOSURES"****BACKGROUND OF THE INVENTION**

The present invention relates to an improved closure and, more  
5 particularly a closure for use with an airtight container.

It is known from our New Zealand patent specification 211227  
to provide an airtight container which includes a body having  
an open mouth into which a closure can sealingly fit. The  
10 mouth includes a peripheral wall surface against which a  
diaphragm of the closure can engage to sealingly close the  
mouth. A toggle arrangement is used to deform the diaphragm  
such that the sealing contact is broken, thereby permitting  
the closure to be removed and reinserted.

15

The closure of the type disclosed in our NZ 211227 has been  
very successful. However, it has been found that when the  
diaphragm is removed, as it often is by the user, it is  
possible to disassemble the toggle arrangement. This can  
20 cause damage to the toggle arrangement and/or present  
difficulty to the user to reassemble the toggle arrangement.

We have also found that it is desirable to be able to change  
the visual appearance of the closure so as to keep abreast of

fashion changes and/or provide closures of different appearance so that container/closure combinations can be distinguished one from the other. For example, it is desirable to be able to provide closures of different  
5 appearances for different resellers of the product.

Furthermore, from a manufacturing point of view, there is always a need to strive for increased production rates with hopefully decreased production costs.

10

#### **SUMMARY OF THE INVENTION**

An object of the present invention is to provide a closure for engagement with the mouth of a container, the closure being of  
15 an improved construction which at least goes some way to achieving one or more of the above desiderata.

Broadly in one aspect of the invention there is provided a closure for the open mouth of a container, the closure  
20 including a resiliently flexible diaphragm sealable against an inside wall surface of the open mouth of the container, a cover with which the diaphragm is mounted and deformation means whereby the diaphragm can be deformed so as to reduce an overall dimension of the diaphragm to break a sealing effect

between a peripheral edge of the diaphragm and the inside wall surface, the cover being formed from first and second cover sections coupled together and retaining therebetween at least part of the deformation means.

5

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

In the following more detailed description of the invention reference will be made to the accompanying drawings in which:-

10

Figure 1 is an exploded view of the closure illustrating the five components thereof,

15

Figure 2 is a perspective view of the lower lid portion of the closure,

Figure 3 is a view similar to Figure 2 but showing one of a pair of toggles in place,

20

Figure 4 is a cross-sectional view of the assembled closure, the cross-section being taken on a diameter through the centre of the axle on which the toggles are mounted,

Figure 5 is a perspective view of the assembled closure but with the toggles not shown in place, and

5 Figure 6 is a perspective underside view of the assembled closure but with the diaphragm removed.

#### **DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION**

Referring to Figure 1, the five components comprising the  
10 closure are illustrated. These components are an upper lid 11, a lower lid 12, a diaphragm 13 and a pair of toggles 30. As will be hereinafter described, the toggles 24 are located on respective axles 21 of the lower lid 12. The toggles are operatively retained in place on axles 21 when the upper lid  
15 11 and lower lid 12 are snap-locked together. The diaphragm 13 is snap-attached to the lower lid 12.

The lower lid 12 includes a peripheral wall 14 which is connected by step 15 to a dished portion 16. Located inward  
20 of the peripheral wall 14 and extending downwardly from step 15 is a lower peripheral wall 18.

Cutouts 19 are formed in step 15. Cutouts 20 are also formed in the floor 17 of the dish portion 16. These cutouts 19 and



20 reduce the amount of plastic required for moulding of the lower lid 12. In addition, they provide an overall strengthening function. Furthermore, the cutouts 19 and 20 provide for drainage, when diaphragm 13 is removed, of any  
5 moisture buildup between the lower lid 12 and upper lid 11.

In the centre of the dished portion 16 there is provided an axle support 21. This projects above the upper surface (as viewed for example in Figures 1-3) of the floor 17.  
10 Projecting from the axle support 21 in opposed radial directions are axles 22. At the distal end of each axle 22 is a stub-axle 23 which is of reduced diameter relative to the main axle 22.

15 Each toggle 24 includes a boss 25 which has therethrough a bore 26. The internal diameter of the bore 26 is just slightly greater than the external diameter of the main axle 22. Projecting outwardly from the boss 25 is a toggle foot 27 which has a toe portion 28 and a cam face 29.

20

Projecting to the other side of the boss 25 is an operating lever 31. In the preferred form of the invention the toggle 24 is moulded from a hard plastic material. A plastic material

which feels softer to the touch is over-moulded on operating lever 31 to form a finger grippable portion 32.

In floor 17 of lower lid 12 are formed a pair of cutouts 33 which are located below the axles 22/23. The cutouts 33 each extend beyond the distal end of the respective axle 23. Cutouts 33 provide a clearance to enable the toggle 24 to be mounted on the axle 22 by inserting the axle 22 into bore 26. This is achieved by positioning the toggle 24 and then sliding the boss 25 onto the axle 22.

When the toggle 24 is placed in position (see Figure 3) the toggle foot 27 locates within a suitably shaped cutout 34 which merges into cutout 33.

15

In Figure 3 only one toggle 24 is shown in position. It will be appreciated that when the other toggle 24 is located in position the operating levers 31 are oppositely disposed. Also, the toggle feet 27 extend in opposite directions as can be seen in Figure 6.

20

The diaphragm 13 incorporates a central boss 35 which in the assembled closure is contactable by the toggle feet 27 as will hereinafter be described.

Extending peripherally about the diaphragm 13 is a wall 36. The upper or distal end of the wall 36 includes an inwardly projecting rim 37. When the diaphragm 13 is assembled with  
5 the lower lid 12 this rim 37 snap-attaches in a groove 38 formed in the lower peripheral wall 18 of the lower lid 12.

A sealing edge 39 is formed at the peripheral extremity of the diaphragm 13. This sealing surface 39 sealingly engages with  
10 a surface of the mouth of the container in which the closure is sealingly located in use.

The upper lid 11 includes a dish portion 40. The dish portion 40 is connected to a peripheral downwardly depending skirt 41  
15 by a stepped portion 42. This stepped portion 42 forms a shelf able to receive the lower end of a similar container so that containers with closures according to the present invention can be stacked one upon the other.

20 In the floor 43 of dish portion 40 there is formed an aperture 44. The aperture 44 is elongate in form and at each end thereof there is formed a housing 45 which has a downwardly depending substantially U-shaped clip 46. This clip 46 is designed to snap-lock engage with the stub-axle 23 when the

upper lid 11 and lower lid 12 are combined. The arrangement is such that stub-axle 23 is held within clip 46.

The outer peripheral surface of the peripheral wall 14 of the lower lid 12 is profiled so that it can snap-lock fit with a similarly profiled inner face surface of the skirt 41 of upper lid 11. As can be seen in Figure 4, the peripheral wall 14 essentially has a rib 47 which interengages with a peripherally extending groove 48 in the inside surface of skirt 41.

With the toggles 24 located on the axles 22 the lower lid 12 can be assembled with the upper lid 11. To achieve this the toggle operating levers 32 are pulled toward one another so as to be able to fit through aperture 44 in floor 43 of the dish portion 40. The upper lid 11 and lower lid 12 can then be brought together so that dish portion 40 locates within dish portion 16. When these mate together, as shown in Figure 4, the peripheral wall 14 of the lower lid 12 snap-fits within the skirt 41 of the upper lid 11. Also, the stub-axles 23 snap-lock into the respective clips 46 of the housing 45 at the opposite ends of elongate slot 44.

The lower lid 12 is thus not only interengaged with the upper lid 11 at the interjoin of the peripheral wall 14 and skirt 41 but is also positively locked centrally to the upper lid 11 by virtue by the stub-axles 23 locking into clips 46. This  
5 interengagement of the clip 46 and stub-axles 23 not only forms a mechanical join between the upper lid 11 and lower lid 12 but also ensures that the toggles 24 are correctly retained on the axles 22.

10 As can be seen in Figure 4, the dimensions are such that the boss 25 of each toggle 24 locates snugly between the axle support 21 and a face surface 49 (see Figure 5) of the housings 45. Furthermore, the dimensioning of the boss 25 and the elongate slot 44 is such that the edge of the slot 44 closely locates  
15 adjacent the surface of the boss 25.

Due to the snap-lock coupling of the upper lid 11 with the lower lid 12 it is difficult to visually see that the lid is formed from two separate components. Thus, the lid portion of  
20 the closure has good structural integrity. Furthermore, it is believed that, in use, an end user will not try and disassemble the toggles 24 from the lid construction 11/12.

With the lid assembled the diaphragm 13 can then be located in place by distorting the diaphragm wall 36 so that the rim 37 can engage in groove 38. The resultant assembly locates the diaphragm boss 35 adjacent the cam face 29 and toe 28 of each toggle 24. Thus, a user can, by gripping the operating levers 30 and squeezing them toward each other, cause the toggle feet 27 to apply a downward force on the diaphragm boss 35.

The force applied by the toggles 24 to the diaphragm boss 35 causes an effective reduction in the diameter of the peripheral edge of diaphragm 13 thereby pulling sealing edge 39 away from the facing surface of the mouth of the container in which the closure is located. The closure can then be lifted away from the container.

15

The same procedure is adopted when placing the closure back in the mouth of the container. Thus, once the closure is located in place the user releases pressure on the toggles. Because of the resiliency built into the diaphragm it restores itself to its normal configuration. This results in the sealing edge 39 engaging in the required sealing manner with the peripheral surface of the mouth of the container. This restoring of the diaphragm 13 to its normal state causes the toggles 24 to revert to their "rest" position.

The present invention therefore provides a closure which is formed of first and second lid sections coupled together and retaining in place therebetween the deformation means in the form of a pair of toggles. These toggles are located opposite one another and can function about a radial axis to achieve a vertical force/movement of the diaphragm. This vertical movement is a preferred form of the invention exceeds about 7mm and thus can deform the diaphragm so that the peripheral sealing edge thereof can be reduced so as to break a seal between the peripheral edge and the sealing wall surface of the open mouth of a container.

Not only does the two-part construction of the lid provide a means of readily locking and retaining the toggles in place but it also permits a manufacturer to have a standard sub-base (the lower lid 12) and diaphragm 13 and thereby only needs to change the cover portion i.e. the upper lid 11 to change the appearance of the closure. Thus, different aesthetic designs can be readily achieved without major retooling on the part of the manufacturer.

It is also believed that the present invention can lead to increased production rates and hopefully a reduction in

production costs. The closure is easy and foolproof to assemble and when assembled retains the toggle mechanism so that it will not fall out and will not be readily accessible by the end user even when the diaphragm is removed.

5

It is also anticipated that the upper and lower lids can be manufactured in a single tool. Sp that upon removal of the components from the tool the lid can be immediately assembled with previously moulded toggles. This will cut down on  
10 handling within the manufacturing plant and also enables quality control to take place at the point of primary manufacture. The assembled lid can then be fitted with a separately manufactured diaphragm to complete the assembly of the closure.

15



**CLAIMS**

1. A closure for the open mouth of a container, the closure including a resiliently flexible diaphragm sealable against an inside wall surface of the open mouth of the container, a cover with which the diaphragm is mounted and deformation means whereby the diaphragm can be deformed so as to reduce an overall dimension of the diaphragm to break a sealing effect between a peripheral edge of the diaphragm and the inside wall surface, the cover being formed from first and second cover sections coupled together and retaining therebetween at least part of the deformation means.
2. A closure as claimed in claim 1 wherein the first and second cover sections are coupled together by first and second separate and spaced apart mechanical connections.
3. A closure as claimed in claim 2 wherein the first mechanical connection is formed by overlapping fitting of a peripheral skirt and a peripheral wall of the first and second cover sections.
4. A closure as claimed in claim 2 or 3 wherein the second mechanical connection is formed by the first cover

section interlocking with a part of the deformation means mounted by the second cover section.

5. A closure as claimed in any one of claims 1 to 4 wherein  
5 the first cover section includes a dish portion which engages within a dished portion of the second cover section.
6. A closure as claimed in claim 5 wherein the dished  
10 portion includes drainage openings for drainage of any accumulation of moisture between the first and second cover sections.
7. A closure as claimed in any one of the preceding claims  
15 wherein the diaphragm is mounted to the cover by the second cover section.
8. A closure as claimed in claim 7 wherein the second cover  
section includes a peripheral groove into which is fitted  
20 a peripheral projection of the diaphragm.
9. A closure as claimed in any one of claims 1 to 3 wherein  
the deformation means includes a pair of toggles  
pivotally mounted with the second cover section, the

pivoted mounting incorporating at least one stub-axle, which is connected to a mounting of the first cover section to form the second mechanical connections.

- 5 10. A closure as claimed in any one of proceeding claims 1 to 8 wherein the deformation means includes a pair of toggles pivotally mounted with the cover, each toggle including an engagement portion engageable with a contact area of the diaphragm.

10

11. A closure as claimed in claim 9 or 10 wherein each toggle includes a lever which projects through the first cover section, said lever being overmoulded with a soft feel plastic material.

15

12. A closure as claimed in claim 9, 10 or 11 wherein the second cover section includes a pair of axles on which engage respectively a sleeve of a toggle, each axle has a stub axle which engages in a snap-lock fitting in a clip  
20 of the first cover section.

13. A closure as claimed in claim 9 or 10 wherein each toggle includes a lever which projects through an opening in the

first cover section, said levers being oppositely disposed.

14. A closure as claimed in claim 13 wherein the lever  
5 projects from a sleeve which is pivotally mounted on an axle carried by the second cover section, the engagement portion being formed by a foot which is coupled to an projects from the sleeve at a side of the sleeve which is opposite to that from which the lever extends.

10

15. A closure as claimed in claim 14 wherein the foot extends on an incline relative to a central pivot axis of the sleeve.

15 16. A closure as claimed in claim 14 or 15 wherein the foot has a distal end which engages -with an area of the diaphragm which is of increased thickness.

17. A closure for the opening mouth of a container, the  
20 closure being substantially as herein described with reference to the accompanying drawings.

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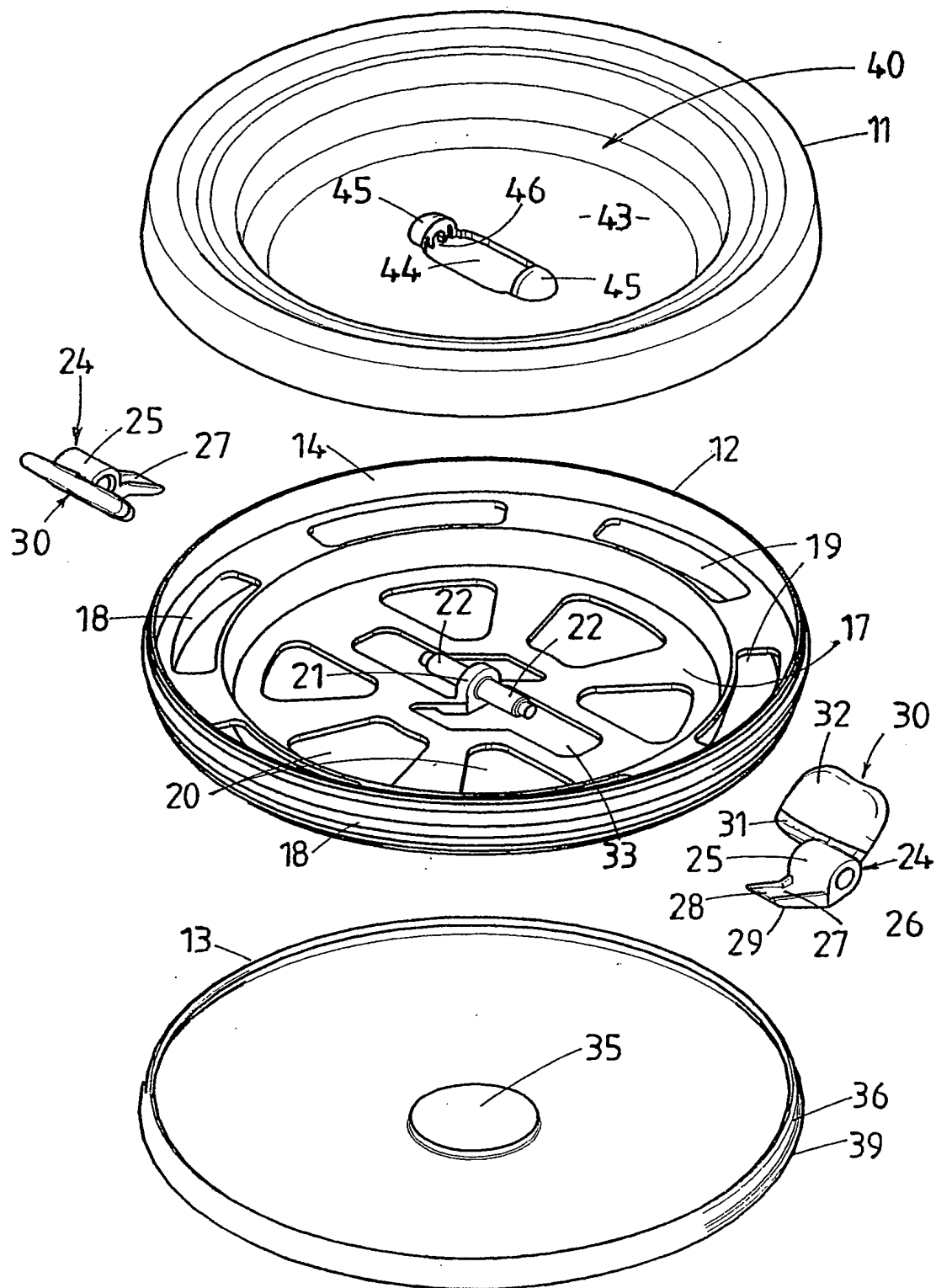


FIG. 1

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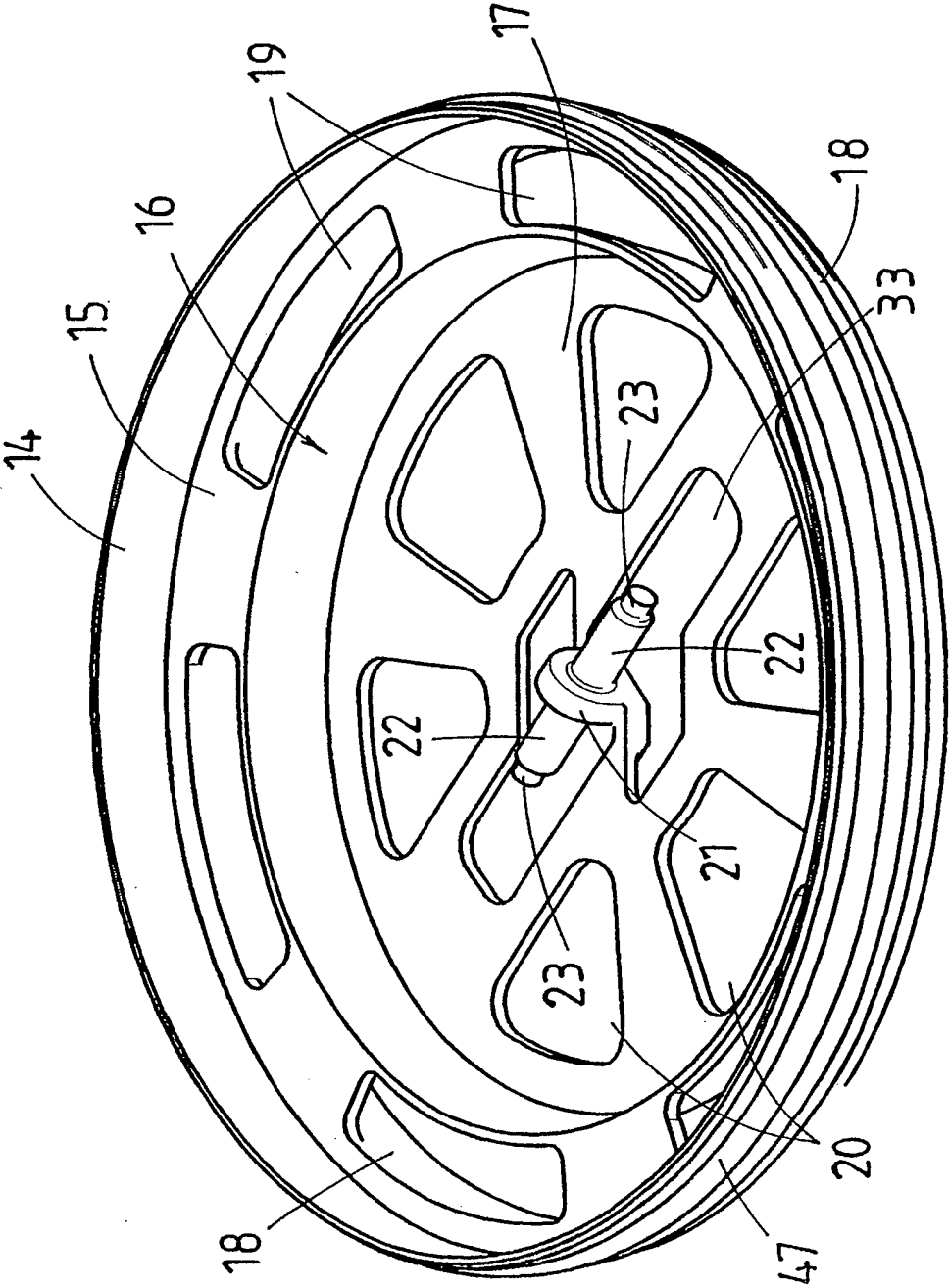
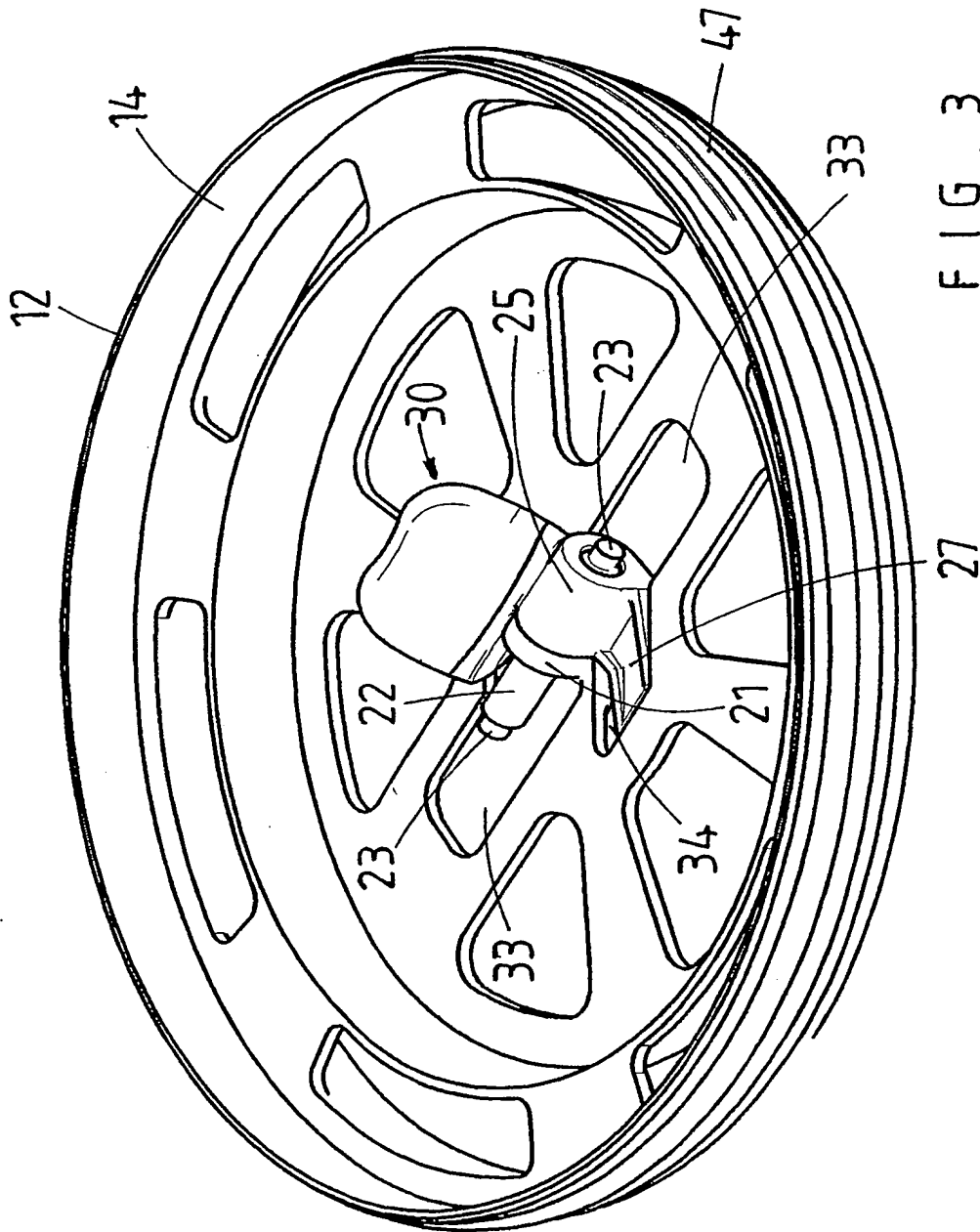


FIG. 2.

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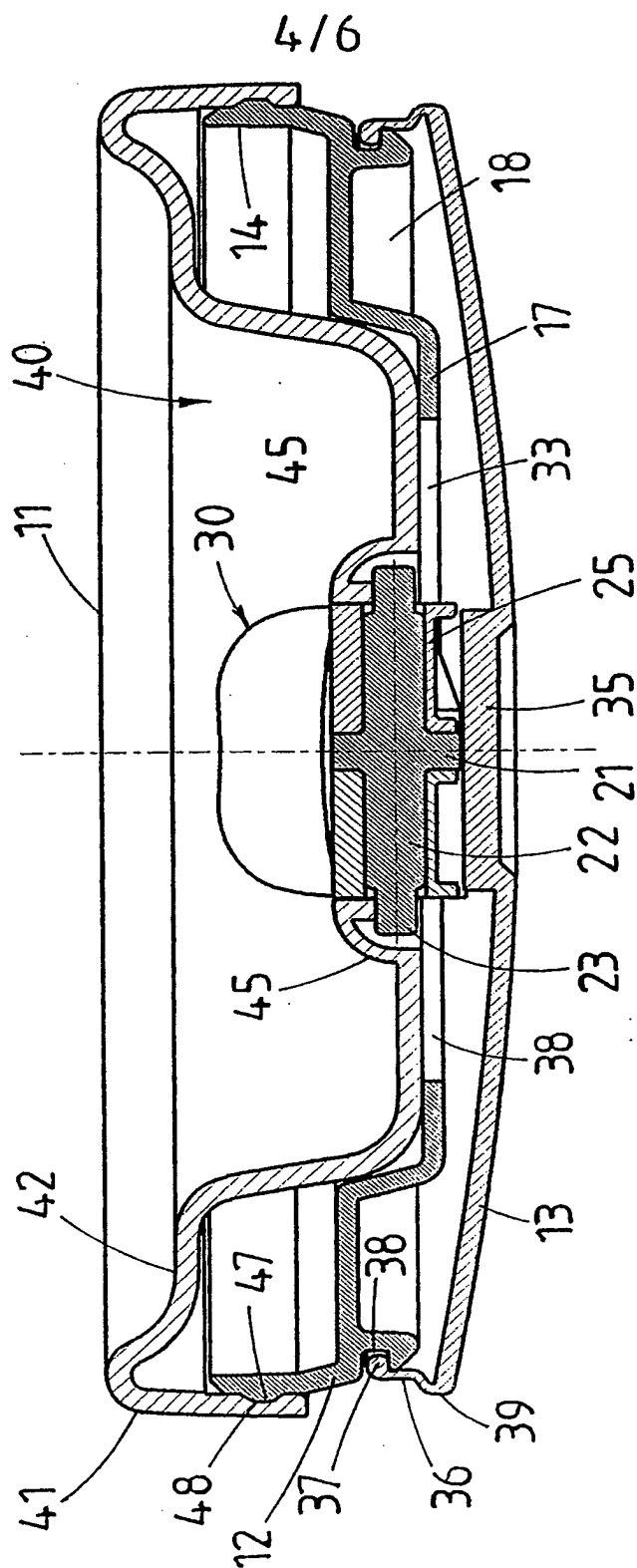


FIG. 4.



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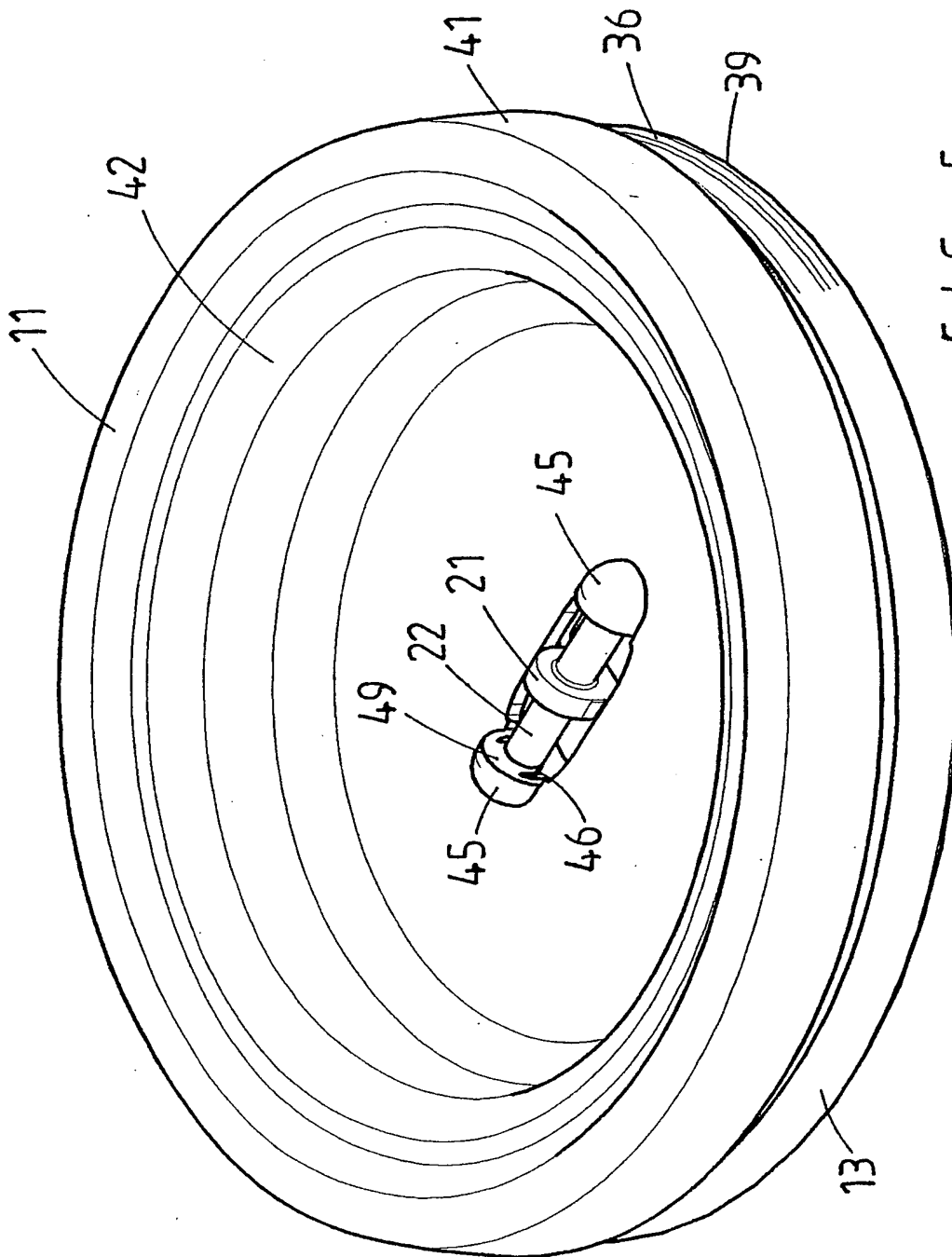


FIG. 5.

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International application No.

**PCT/NZ02/00173**

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report			Patent Family Member
US	5660302		NONE
US	4747511	WO	88/00560
GB	2299575		NONE
END OF ANNEX			